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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/973,209 | 10/09/2001 | Winston Z. Ho | | 5806 |

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LIU & LIU
444 S. FLOWER STREET SUITE 1750
LOS ANGELES, CA 90017

| EXAMINER | |
|---|---|
| YU, MELANIE J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1641 | |

DATE MAILED: 03/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/973,209 | HO, WINSTON Z. | |
| | Examiner | Art Unit | |
| | Melanie Yu | 1641 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *24 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-11 and 21-30* is/are pending in the application.

4a) Of the above claim(s) *23-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-11,21 and 22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 October 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. Applicant's amendment filed 24 January 2005 has been entered.

### *Election/Restrictions*

2. Newly submitted claims 23-30 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claims 23-26 are drawn to a method, which is different from the method of group I, claims 1, 3-11 and 21-22. Claims 23-26 require an output channel, which is not required of the method of group I. The method of group I requires reaction zone, which is not required of the method of claims 23-26. Furthermore, claims 27-30 are directed to a product which can be used in materially different processes. The biochip of claims 27-30 can be used in the method of group I or the method of claims 23-26.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 23-30 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

### *Status of the Claims*

3. Claims 1 and 3-7 are currently amended. Claims 2 and 12-20 are canceled. Claims 21-30 are new. Claims 1, 3-11 and 21-30 are currently pending.

### *Withdrawn Rejections*

4. The priority requirement of claim 2 has been met by the two provisional patent applications because the subject matter of claim 2 is met in provisional application 60/287,781. Rejections of claims 2, 3, 4 and 6 under 35 USC 112, second paragraph have been withdrawn in light of the amendments to these claims. Rejections under 35 USC 102(b) under Nelson and 35

USC 102(e) under Anderson et al. have been withdrawn in light of the amendments to the claims.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 1 is rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. In part c, terminating flow is critical or essential to the practice of the invention, but not included in the claim(s) is not enabled by the disclosure. See *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). The termination of flow is essential to the practice of the invention because it is a method step that affects the reaction of fluid with at least one biological probe. Furthermore, in the response dated 24 January 2005, Applicant considers termination of flow essential by arguing that reference Nelson does not teach terminating flow after fluid has been transported to a reaction chamber.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1, 3-11, 21 and 22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, part a, recites the phrase "serpent-like structure" which is vague because it is unclear what structure is encompassed by serpent-like. It is unclear whether the structure must be curved or to what extent in order to be considered serpent-like. Regarding part b of claim 1, it

is unclear how a constant and consistent reaction volume is defined, and it is unclear how physical barriers are independent of the defined reaction volume.

Claim 6 is vague and indefinite because it is unclear where an external magnet is adjacent to the reaction zone. It is further unclear whether the external magnet is located within the microfluidic channel or externally to the biochip.

Regarding claims 1 and 7, it is unclear how the biological probes are immobilized on a reaction zone within a microfluidic channel as recited in claim 1, because it appears the biological probes are immobilized on a first plate which is different from the second plate of the microfluidic channel as recited in claim 7. Therefore, it is unclear whether the biological probes are actually immobilized in the reaction zone which is located in the microfluidic channel.

Claims 21 and 22 are vague and indefinite because it is unclear how the fluid is meant to flow "pass and beyond" the reaction zone. It is unclear whether the fluid and the sample is meant to flow beyond the reaction zone or whether the sample is meant to bind to the biological probes within reaction zone while the fluid continues to flow through the reaction zone. Furthermore, if the flow is terminated in order to allow a portion of the fluid to react with the biological probes, it is unclear if by transporting the fluid passed the reaction zone allows for reaction between the flowing fluid and the reaction zone.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 3-11, 21 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Blackburn (US 2003/0190608).

Blackburn teaches a method for performing biological reaction in a microfluidic biochip platform, comprising the steps of: providing a plurality of microfluidic channels (Fig. 7C; par. 0049), said microfluidic channels each including a reaction zone defined by a section of a curved serpent-like structure (32, upper left hand corner, 34, Fig. 6; par. 0053, 0155), the reaction zone having a constant cross section area (32, Fig. 6; par. 0164); immobilizing at least one biological probe in the reaction zone (par. 0049, 0152), to define a constant and consistent reaction volume independent of physical flow barriers in the microchannels to allow fluid to pass the reaction zone (reaction volumes are the same size through the biochannel, and are therefore constant, consistent, and independent of physical flow barriers, the reaction volumes also allow fluid to pass the reaction zone; par. 0150); and transporting fluid in the microfluidic channels to the reaction zone (par. 0156). Blackburn fails to specifically teach terminating flow to allow a portion of the fluid to react with the at least one biological probe. However, Blackburn teaches a valve for controlling the flow of fluid for binding, which would be capable of terminating flow and altering flow to promote binding (lower right hand corner, 34, Fig. 6; par. 0154, 0156). The method taught by Blackburn is further capable of creating a reaction volume is a product of the cross-section area multiplied with the length of the microfluidic channels, because claim 1 does not recite any further product or method limitations in order to determine a reaction volume being a product of the cross section multiplied by the length.

Regarding claims 3-5, Blackburn teaches a the microfluidic biochip further comprising microfluidic channels having cross sectional dimensions on the order of 0.1 μm to 500 μm (par. 0164), which encompasses the recited range of between 0.5 μm and 2mm. Blackburn further teaches at least one sample well containing a sample (chamber, Fig. 7A, B; par. 0059, 0099, 0167) and at least one reagent well containing a reagent (device can further comprise wells for samples and reagents; par. 0099), wherein a portion of the microfluidic channels is connected to the at least one sample well and the at least one reagent well (microchannels are placed between wells for samples and reagents; par. 0099). Blackburn also teaches fluid in the microfluidic channels transported by a pressuring mechanism that provides a forward-moving fluid (par. 0156).

With respect to claim 6, Blackburn teaches at least one biological probe immobilized on magnetic beans (par. 0266), and wherein the step of immobilizing at least one probe in the reaction zone comprises: transporting the magnetic beads through microfluidic channels (fluid flow control system allows fluid to pass over DNA separation chamber, therefore the magnetic beads are transported through microfluidic channels, par. 0337); providing at least one external magnet adjacent a reaction zone (electromagnet, par. 0339, 0357); and activating at least one external magnet to trap the magnetic beads (par. 0337, 0339, 0357).

Regarding claim 7, Blackburn teaches the method comprising: at least one biological probe immobilized on a first surface of a first plate (biological molecules are adhered to surfaces, which can be interpreted as a "first plate" and coupled with the microfluidic channel in the second plate; par. 0159, 0160, 0163); a microfluidic channel patterned on a second surface of a second plate (microchannels can be etched within one plane of two or more planar substrates

stacked together; par. 0151); and the first surface of the first plate coupled with the second surface of the second plate (two or more planar substrates are stacked and joined together; par. 0145, 0151).

With respect to claims 8-11, Blackburn teaches the probe being a protein (par. 0103), nucleic acid (par. 0104), or biological cell (par. 0103). Blackburn further teaches the method comprising the step of detecting a reaction in the reaction zone (target analytes bind in reaction zone and are detected; par. 0102).

Regarding claims 21 and 22, Blackburn teach transporting fluid passed and beyond the reaction zone (fluid passes DNA separation chamber, which can be a reaction zone; par. 0053, 0163, 0337), and although Blackburn does not specifically teach a reaction volume, a volume of fluid remains in the reaction zone, and can be referred to as a reaction volume. Blackburn further teach transporting fluid from the reaction zone after a reaction has taken place, by flowing fluid passed the reaction zone in the same direction as flow of fluid into the reaction zone prior to the reaction taking place (fluid is flowed through the reaction zone and realized from the reaction zone after binding takes place; par. 0337).

***Response to Arguments***

*8.* Applicant's arguments and amendments, see pages 8-12, filed 24 January 2005, with respect to the rejection(s)of claim(s) 1-11 under 35 USC 102(b) over Nelson and 35 USC 102(e) over Anderson et al. have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Applicant's amendments of microfluidic channels each including a reaction zone defined by a section of curved serpent-like structure and defining a constant and consistent reaction

volume, which are not taught by Nelson or Anderson et al. Blackburn, as applied to the instant claims above, teaches the method of claims 1, 3-11, 21 and 22.

***Conclusion***

No claims are allowed.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie Yu whose telephone number is (571) 272-2933. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Melanie Yu
Patent Examiner
Art Unit 1641

LONG V. LE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1600
03/17/05